Welcome the opportunity to give you an overview of what we are doing at NASA. As contributing citizens of this great country of ours you have a considerable investment in aeronautics and in space and you should be informed on the status of that investment. And as leaders and molders of opinion you can help us to inform others.

NASA will be 20 years old this fall. We have become a mature but imaginative and useful agency providing unique and needed services to other government organizations, to industry, to the scientific community, to the public, to other nations, and in fact to all humanity. Our work falls generally into four basic areas,

0 research and development to preserve United States leadership in aeronautical science and technology,

0 earth observation and the application of the knowledge gained to human welfare,

0 scientific exploration of the universe to determine the place of Earth and Man in the scheme of things,

0 investigation of the sun-earth relationships so basic to the whole bio-system in which we evolved and in which we live, and

0 transfer to new technologies developed to the private sector, other agencies and levels of government and all appropriate sectors of our society as rapidly and efficiently as possible.

Let me illustrate some of the high points of these areas with a few slides.

The first "A" in NASA stand for "aeronautics", a fact too often forgotten since we are referred to so often as "the space agency".

Air transportation is a key element in our nation's economy. Much of our commerce, domestically and for export, moves by air. The U.S. aviation industry is second only to agriculture in export value and thus a major factor on the positive side of the balance of payments ledger. This industry is currently faced with serious challenges of rising costs, energy shortages, environmental demands and foreign competition. As the nation's primary aeronautical research agency, our job is to develop ways, in partnership with the industry, to meet those challenges in terms of economy, efficiency, performance and environmental acceptability.

Slide 1
77-HC-21

This is the Quiet Short Haul Research Aircraft with which we are attempting to solve the problem of airport congestion and airport noise. QSRA promises a solution by permitting the use of other, secondary, often more convenient fields: Midway instead of O'Hare, Oakland instead of San Francisco, Ontario instead of Los Angeles, Washington National instead of Dulles for example. It can expedite traffic and add to public convenience by using special or short runways at major airports leaving the long ones to the long-haul carriers. It can add further to public convenience by quiet landings and take-offs after the curfew for conventional traffic, delivering cargo closer to transshipment points. With air traffic increasing and available ground space in short supply it can remove the necessity for extending runways or building new facilities and make present facilities more productive. And coupled with short take-off and landing technology it can eventually bring quiet, efficient, economical air service to small communities for the first time.

Slide 2

This is another research tool, the Rotor Systems Research Aircraft, designed to fly as a pure helicopter, compound helicopter or fixed wing aircraft. The RSRA will be used to develop and test a wide variety of rotor systems and integrated propulsion systems and serve as a standardized base for comparing them.

Slide 3

This is the tilt-rotor aircraft developed by NASA, Bell Helicopter and the U.S. Army. The tilt-rotor is expected to combine the best features of helicopters and conventional airplanes for fast point-to-point transportation.

Slide 4
75-HC-7

This is the worlds fastest jet-powered aircraft, the YF-12. It can fly at sustained speeds of over 2,000 mph at altitudes above 70,000'. It is being used to help provide the technology necessary for the development and operation of future high speed aircraft, both military and civilian.

Slide 5
78-HC-110

Here we have what we call the HiMat for Highly Maneuverable Aircraft Technology. This artists conception shows the unmanned, remotely piloted research vehicle being launched from a B-52. Two scale models will be flown at NASA's Dryden Flight Research Center, in a joint NASA/USAF program, to develope advanced technology for high maneuverability using new technology from various technical disciplines.

Slide 6
76-HC-858

This strange looking object is another remotely piloted research vehicle. It is flown by a test pilot in a ground cockpit using television and telemetry. The oblique wing can be rotated on its center pivot so that it can be set at its most efficient angle for the speed at which it is flying. This allows the aircraft to make use of the advantage gained by a swept wing configuration at high speeds while offsetting some of the drag producing air disturbances that normally result from the swept-wing configuration. This could lead to supersonic transports of the future that would be quieter and up to two times as energy efficient.

Slides 7-14
76-HC-683
76-HC-681
76-HC-87
76-HC-680
76-HC-692
76-HC-873
76-HC-687
76-HC-563

Space Transportation System flight sequence--artists conception.

Slides 15-20
77-HC-340
77-HC-343

Orbiter separation and landing sequence--actual.

An important part of STS workload will be scientific exploration, both earth orbit and, with propulsive stages, beyond the earth. Planetary exploration has had a good--and expensive--start.

0 Slides 21-22-(Mars and Phobos)--These are examples of the Viking exploration, from the surface and from orbit; with STS, can foresee future mobile exploration of entire surface. Near planets (Mars and Venus) may offer clues to origin of life, are very important as climatalogical laboratories (comparative planetology), and help fill in data on creation of solar system and earth. Far planets equally important:

0 Slides 23-24-(Voyager and Earth-Moon)--Mission currently under way to Jupiter, Saturn and Uranus; to better understand the giant planets, their structure, (rings), history, and role in solar system development, Earth-Moon picture as evidence it is working.

0 Slide 25-(JOP)--Even more ambitious is the investigation of Jupiter, both from orbit and within its atmosphere, and of its own miniature planetary system (Jupiter sometimes acts like a star, with more energy output then input). Note cooperative (FRG) aspects.

Communications Applications

0 Slides 26-29 (Communications)--Space communications were the earliest of the global practical applications of space technology. Has enormous economic importance (Slide 26); has tremendous social utility (Slide 27); can now be deployed anywhere (Slide 28); technology extends to other regimes (Slide 29-Search and Rescue). Foresee the STS possibilities of building really

large antennas -- hemispheric CB -- and of expanding telephone exchanges into space. Electronic mail, checkless banking, data library access, medical services -- all possible with careful spectrum conservation, orbital spacing, and STS-related technological advances.

- Space telecommunications have shrunk the world, and brought people together in a new way; Intelsat continues to grow; nations can choose to skip the land-line infrastructure buildup; impact on world knowledge of world affairs has been enormous and beneficial. But perhaps the most exciting contribution of space to wise management of the planet has been the ability to see the world in its entirety as a natural system......

Remote Sensing Applications

- Slide 30-(Global Information)--Concept of integrating the many individual space data streams dealing with the earth and its environs into continuing, accurate, and timely management information packages -- dealing with problems ranging from food to pollution to disaster avoidance.

- Slide 31-(Global Weather)--Weather and climate affect us all; monitoring from space leads to models that can predict.

- Slide 32-(Florida Freeze)--Important to note that synchronous satellites can measure hourly changes, and that people can react in self-interest to actual changing conditions (smoke pots for citrus, course changes in navigation, deployment of materials in floods, etc.).

- Slide 33-(Severe Storm)--An Example of how new weather modelling techniques with space data improve accuracy of forecasts; important economically and socially in terms of warning and preparation lead-times. Weather and climate are dynamic and complex;

monitoring has to be on a scale of hours; terrestrial activity is more relaxed and scale is more in days or weeks.

- Slide 34-(Saudi Arabia)--This is from Landsat 1, multipurpose earth observing satellite, after computer enhancement -- geography, geology, land use, agriculture, and patterns of man's management of resources can be seen. Note Landsat I just turned off in January after $5\frac{1}{2}$ years.

- Slide 35-(Land use)--Value of multispectral data: permits extraction and display of specific information. Note world-wide availability of such data, either through own ground stations or at low cost from U.S.

- Slide 36-(Snow)--Note value of repetitive coverage at long intervals to establish baselines and changes therefrom for predictive purposes.

- Slide 37-(Water Quality)--Note value of repetitive coverage and analysis techniques for understanding pollution and sediment transport, allowing better water management.

- Slide 38-(Mineral)--An important aspect of remote sensing is geological analysis and extension of ground truth from space.

- Landsat-3 just launched -- 5th channel to improve information content -- Landsat D in 1981 to improve even further. Other systems include HCMM, Seasat, improved meteorological systems: great challenge of next decade is fusing of data into manageable information, building and maintaining world's data bank, and creating natural predictive models that can guide human action (agriculture, pollution, land use, disaster amelioration, transportation, non-renewable resources, energy). Values are social and economic; responsibility for future of the planet -- and its children -- must be shared by every inhabitant, knowledge is the starting point, and space systems are a key resource in the acquisition and distribution of that knowledge.

VI. Energy Applications

- In closing, touch upon both immediate and far future concerns of the world -- energy.

- Slide 39-(Windmills)--An application of modern aeronautical engineering to world's second-oldest energy source, the wind. Limited by climate, geography and fact that power is consumed at instant of manufacture.

- Slide 40-(SSPS)--Concept of using the oldest energy source, the Sun. Only a possibility today, not yet a program -- technologies need to be developed, safeguards understood, economics worked out, distribution and storage improved. But possibility is real -- STS and successors are key to building and operating giant systems in space for the use by inhabitants of earth. And, eventually, for the civilization of space as human civilization presses outward in the next great adventure of man.

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